

Books by G Gamow

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There have been many great scientists – I don't need to give examples! – and many popular science writers – Issac Asimov's is perhaps one of the names that comes to mind immediately. But Gamow belonged to that rare species of *first class scientists* who are also *first class science communicators*. It is hard to name another from the same species. He contributed significantly to science (see the Article-in-a-box, Box 1 and articles on his work appearing elsewhere in this issue). At the same time he wrote prolifically communicating the essence of science in an effective and beautiful way that made for pleasurable reading. His articles in the *Scientific American* and his many books (see Box 2 for a list of his books) are a must for school/college libraries and are worth any effort one may expend in acquiring them. In fact, it was the availability of many of Gamow's books and collections of articles from *Scientific American* in the Library of the National College, Basavanagudi, Bangalore, that is responsible for many of us who studied there taking to Science as a career. One of the books I particularly remember is a Kannada adaptation, *Vichitralōkadalli Vidyālankāra*, of *Mr. Tompkins in Wonderland* by B V Subbaryappa; Gamow has a couple of sentences in Kannada expressing his happiness on his book appearing in Kannada!

Gamow's Writings

A distinguishing feature of Gamow's writings, indeed of his life itself, is universality. They represent Science as a whole. Importantly, he does not avoid mathematics if and when necessary unlike most of the 'popular' science writers. (I have seen many popular science books where the fact that the book does not contain a single mathematical equation is

Box 1.

- 1928 Explained nuclear alpha decay by quantum mechanical tunneling;
- 1928 Pioneered the liquid-drop model in nuclear physics;
- 1936 Described, with Edward Teller, spin-induced nuclear beta decay;
- 1938 Introduced the "Gamow" factor in stellar reaction rates and element formation;
- 1939 Modeled red giants, supernovae, and neutron stars;
- 1948 Developed the "Big Bang Theory" of the universe;
- 1954 First suggested how the genetic code might be transcribed.

– Courtesy: www.colorado.edu/physics/Web/Gamow/

Box 2.**The Mr. Tompkins Series**

- 1939 Mr. Tompkins in Wonderland
- 1944 Mr. Tompkins Explores the Atom
- 1953 Mr. Tompkins Learns the Facts of Life
- 1967 Mr. Tompkins Inside Himself (with M Ycas)

Other Popular Writing

- 1940 The Birth and Death of the Sun
- 1941 Biography of the Earth
- 1947 One, Two, Three... Infinity: Facts and Speculations of Science
- 1953 The Moon
- 1958 Puzzle-Math
- 1961 Biography of Physics
- 1962 Gravity
- 1963 A Planet Called Earth
- 1964 A Star Called the Sun
- 1966 Thirty Years that Shook Physics: The Story of Quantum Theory

Science Text Books

- 1931 The Constitution of Atomic Nuclei and Radioactivity
- 1937 Structure of Atomic Nuclei and Nuclear Transformations
- 1947 Atomic Energy in Cosmic and Human Life
- 1949 Theory of Atomic Nucleus and Nuclear Energy Sources, with C.L. Critchfield
- 1952 The Creation of the Universe
- 1958 Matter, Earth & Sky
- 1960 Physics: Foundations & Frontiers with John M. Cleveland
- 1961 The Atom and its Nucleus

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displayed prominently!) Gamow himself illustrated most of his books and so they complement what he intends to convey in the text beautifully.

I shall briefly talk about two of his books which are among my all time favourites:

1. *One two three ... infinity – Facts and Speculations of Science* (1947).

2. *Mr. Tompkins inside himself* (with M Ycas, 1967).

The first one above is currently available in Dover edition (list price: USD 10.95) while strangely the second one is out of print for a long time. (The first two of the Tompkins series, *Mr. Tompkins in wonderland* and *Mr. Tompkins Explores the Atom*, have appeared together as a Canto classic edition, *Mr.*



Tompkins in paperback). With the current interest in genetics and biotechnology among students and general public, its resurrection is highly warranted.

One Two Three ... Infinity

This book first published in 1947 has been a huge success and has appeared in many languages (including Hindi?) around the world. In Gamow's words this book is ... *of atoms, stars, and nebulae, of entropy and genes; and whether one can bend space, and why the rocket shrinks.* The book starts with two chapters on *Playing with numbers*. This reinforces the statement I made earlier regarding the place Gamow affords to mathematics in his books. One could say that the content discussed is not directly relevant to the topics he treats in the book. But it serves as a warming up for the things to come later besides being of great interest in itself. It also shows the subtle difference between mathematics and other sciences. Writing the preface for the 1961 edition of the book Gamow observes that *all books on science are apt to become out of date a few years after publication ...* So while the contents of the 3/4ths of the book might one day become only of historic value the first part containing the two chapters on numbers will never become out of date. That is what G H Hardy refers to as the *permanence* of mathematical truths.

Mr. Tompkins inside himself – Adventures in the New Biology

This surely ranks among the best books on

the science of life. Gamow had followed up his first two Tompkins' books – the first on relativity and the second on quantum physics – with one more on biology, *Mr. Tompkins learns the facts of life* in 1953. But since that very year, as the authors say in their preface, ... *biology has entered a "golden age," with one important discovery following another.* This book was rewritten in 1967 where they attempt to give a broader view of biology, including recent developments in molecular biology.

In the 5th Chapter, *The number of the beast*, they explain genetic coding to which Gamow himself has contributed while the 8th chapter, *The Maniac* introduces one to the world of computers and programming. One of the significant features of Gamow's books are the stories he narrates somewhat along the lines of a *Harikatha* performance. For instance, at the final stages of a trip through his own body (in his dream, of course) Tompkins confronts the professor accompanying him with the following question: "I see very well now how my body, my heart, my lungs, my stomach, my muscles, my nerves, and even my brain operate. But who am I? It seems that I have never met myself inside my own body!" The professor tells him a story which he claims will help Tompkins form his own answer to this question. (I hope your curiosity has been sufficiently roused so that you will stop reading this review and go to the library to search for the book!) I cannot resist the temptation to give a sample of his stories, so here is one which is at the end of the 8th chapter, *The Maniac*:

(Mr. Tompkins:) "But may I ask you a last question: what is the future of electronic computers as they grow larger and larger and more and more complicated?"

"Let me tell you a little story," said the mathematician with a wry smile. "Humanity was celebrating the beginning of the twenty-first century, by which time technology had made tremendous advances. A giant super-transistor electronic brain was constructed, which occupied the entire inner court of the Pentagon building. It contained 10^6 transistors and 10^6 memory centres. The memory was supplied daily with economic, socio-logical, and military information collected by 10^5 secret agencies all over the world, and was supposed to be able to predict the world developments for 10^2 years ahead. The grand opening was attended by the then President of the United States and by all political and military dignitaries. Just as at the beginning of a baseball season the President throws the

first ball, so in this case he was requested to ask the first question.

"Will you tell me, please," he asked the computer, 'will there be war or peace within the next five years?'

"Because of the complexity of the question, the computer took almost ten minutes to consider it. The answer was very short: 'Yes.'

"The embarrassed designer rapidly fed into the computer another question: 'Yes what?'

"This time, within one microsecond, the computer came back with the right answer: 'Yes, sir.' "

So while Gamow may not have visualised how computers would be in future he was dead right as to who would own it and use it for what purpose!

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There was a young man from Trinity
Who took the square root of infinity
But the number of digits
Gave him the fidgets
He dropped Math and took up Divinity.

— George Gamow
(One, two, three... infinity!)



George Gamow with
C V Raman at University
of Leningrad.

